1. JP,08-124753,A(1996)

JAPANESE [JP,08-124753,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE INVENTION TECHNICAL PROBLEM MEANS OPERATION EXAMPLE DESCRIPTION OF DRAWINGS DRAWINGS

[Translation done.]

* NOTICES *

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] this invention relates to the shield ring prepared for electric-field relief in the bushing used for electrical machinery and apparatus, such as a gas insulated switchgear, a gas circuit breaker, and a transformer.
[0002]
[Description of the Prior Art] A gas circuit breaker is shown in drawing 6 as one example of an electrical machinery and apparatus. The gas circuit breaker of illustration forms two bushings 2 and 2 on a tank 1, and forms the up terminals 3 and 3 and the low-tension side shield rings 4 and 4 in each bushings 2 and 2, respectively. This shield ring 4 eases the electric field in a bushing 2, and prevents generating of the corona in mind.
[0003]
[Problem(s) to be Solved by the Invention] The above-mentioned shield ring 4 is formed only for electric-field relief, and does not have other functions. It is significant if the function of the electromagnetic wave detection by the partial discharge in an electrical machinery and apparatus and also an amplitude-measurement function, and a partial-discharge pulse detection function can be given to this shield ring 4.
[0004] this invention aims at giving various sensor ability to the shield ring for electrical machinery and apparatus bushings.
[0005]
[Means for Solving the Problem] In order to attain the above-mentioned purpose, this invention constitutes a slot-like current resonance circuit in the shield ring for electrical machinery and apparatus bushings by countering the shield ring prepared in the low-tension side of the electrical machinery and apparatus bushing section, preparing the electric conduction ring which was prepared in the electrical machinery and apparatus side, and was grounded, and connecting electrically a part of shield ring and some electric conduction rings.
[0006] the capacity which constitutes the potentiometer for **** for the electrical installation portion between the shield ring and an electric conduction ring in the shield ring for electrical machinery and apparatus bushings of further the above [this invention] -- or it connects by the pulse transformer
[0007]
[Function] If a corona occurs in the interior of an electrical machinery and apparatus, a RF several kHz - 1GHz or more will occur, and an electromagnetic wave will be emitted. To this RF, the shield ring, the electrical machinery and apparatus earth side, or an electric conduction ring operates as a slot antenna. Therefore, the corona generated inside the electrical machinery and apparatus is detectable by detecting the voltage generated in this slot antenna.
[0008] Moreover, by connecting a part for the connection between the above-mentioned shield ring, the electrical machinery and apparatus earth side, or an electric conduction ring with the capacity which constitutes the potentiometer for ****, a partial pressure is carried out between the stray capacity generated in the shield ring, and the voltage currently impressed to the bushing terminal can be measured by measuring the voltage of the ends of capacity. Furthermore, the partial discharge generated inside the electrical machinery and apparatus is detectable by connecting a part for the connection between the above-mentioned shield ring and an electric conduction ring by the pulse transformer.
[0009] Thus, various sensor ability can be given to the shield ring for electrical machinery and apparatus bushings in this invention.
[0010]
[Example] Drawing 6 shows the gas circuit breaker as one example of an electrical machinery and apparatus with which the shield ring for bushings of this invention is applied. Two bushings 2 and 2 are attached, the up terminals 3

and 3 are formed in the upper limit of each bushings 2 and 2, respectively, and, as for the tank 1 of the gas circuit breaker of illustration, the shield rings 4 and 4 are formed in a end face side. Stray capacity C' exists between the up terminal 3 and the shield ring 4. In addition, the high-tension-side shield ring can also be prepared in up terminal 3 and 3 side.

[0011] The detail of the shield ring 4 is shown in drawing 1 . (a) of drawing shows a plan and (b) shows a side elevation. The shield ring 4 is formed in C form which formed notching 6 in a part of annular member. This shield ring 4 is countered and the electric conduction ring 5 is formed in the gas-circuit-breaker tank 1 side. This electric conduction ring 5 is formed in C form which formed notching 7 in the annular member like the shield ring 4. It is arranged so that the notching 6 of the shield ring 4 and the notching 7 of the electric conduction ring 5 may counter. Moreover, the electric conduction ring 5 is laid on the tank 1 of a gas circuit breaker, and is grounded.

[0012] Support fixation of the shield ring 4 is carried out by the insulating supports 8 and 8 at the electric conduction ring 5. Moreover, the end of C form of the shield ring 4 and the end of C form of the electric conduction ring 5 are connected with a conductor 9 through the CC unit 10, and the other ends are connected with a conductor 11 through the pulse CT unit 12. About the detail of the CC unit 10 and the pulse CT unit 12, it mentions later.

[0013] In the place and opposite side by which these CC unit 10 and the pulse CT unit 12 have been arranged, the antenna terminal area 13 is connected between the point A of the shield ring 4, and the point B of the electric conduction ring 5. About the detail of the antenna terminal area 13, it mentions later. The CC unit 10 is explained using drawing 2 . The case 14 of the CC unit 10 is laid on the electric conduction ring 5. Moreover, the end of the conductor 9 connected with the shield ring 4 is drawn in a case 14. The capacitor 15 for partial pressure is connected between a conductor 9 and the electric conduction ring 5 into a case 14. Moreover, the light PT 16 which is a voltage converter is connected to the ends of the capacitor 15 for partial pressure, and the output is drawn by the exterior of a case 14 through an optical fiber 30. Furthermore, the RF prevention inductance 17 is connected to the ends of the capacitor 15 for partial pressure.

[0014] The pulse CT unit 12 is explained using drawing 3 . The case 18 of the pulse CT unit 12 is laid on the electric conduction ring 5. Moreover, the end of the conductor 11 connected with the shield ring 4 is drawn in a case 18. Into a case 18, the RF prevention inductance 19 and an arrester 20 are connected in parallel between a conductor 11 and the electric conduction ring 5, and the series-connection object of a pulse CT 22 is further connected with a capacitor 21. Furthermore, a capacitor 23 is connected to the upstream of a pulse CT 22 in parallel. The secondary of a pulse CT 22 is drawn by the exterior of a case 18 through a coaxial cable 24.

[0015] In addition, like this example, when forming both the CC unit 10 and the pulse CT unit 12, either of the RF prevention inductances 17 and 19 can be omitted. The antenna terminal area 13 is explained using drawing 4 . The case 25 of the antenna terminal 13 is laid on the electric conduction ring 5. The end of the conductor 29 connected with the shield ring 4 is drawn in a case 25. the inside of this case 25 -- setting -- a bypass capacitor 26 -- the inside of a conductor 29 and a coaxial cable 28 -- it connects between conductors moreover, the RF prevention inductance 27 -- the inside of a coaxial cable 28 -- it connects between a conductor and the electric conduction ring 5 the outside of a coaxial cable 28 -- a conductor is grounded

[0016] Next, each function is explained. The amplitude-measurement function of the introduction pulse CT unit 12 is explained. In the CC unit 12 shown in drawing 2 , the capacitor 15 for partial pressure pressures voltage partially between stray capacity C' shown in drawing 6 . Therefore, the voltage of the up terminal 3 of a bushing 2 can be measured by measuring the voltage of the ends of the capacitor 15 for partial pressure.

[0017] In this example, although the measurement signal is outputted to the measuring circuit which connects light PT 16 to the ends of the capacitor 15 for partial pressure, and is not illustrated by the optical fiber 30, it can replace with light PT 16 and other suitable voltage transducers can be used. Moreover, an inductance 17 has a to some extent high impedance to a commercial frequency, and, thereby, makes a charge when the shield ring 4 is charged discharge in drawing 2 . Therefore, high resistance can also be used instead.

[0018] Next, the partial-discharge pulse detection function of the pulse CT unit 12 is explained. When a partial discharge occurs in the interior of a gas circuit breaker, a pulse current passes along the inner conductor of a bushing 2, and flows from the up terminal 3 to the earth side through stray capacity C'. Therefore, as shown in drawing 3 , a pulse current can be passed to a pulse CT 22 by connecting a pulse CT 22 to a capacitor 21 in series. And the secondary of a pulse CT 22 can be drawn and measured to the measuring circuit which is not illustrated with a coaxial cable 24.

[0019] In addition, it can also be made to transmit using an optical fiber by making it go via a suitable E/O converter etc. instead of a coaxial cable 24 An arrester 25 discharges, when the high voltage occurs between the shield ring 4 and the electric conduction ring 5, and it protects. Furthermore, the electromagnetic wave detection function by the partial

discharge is explained.
[0020] SF6 like a gas circuit breaker In the case of a gas insulation device, if a corona occurs inside, the RF more than VHF will occur and an electromagnetic wave will be emitted. the capacitors 15, 21, and 23 in the pulse CT unit 12 shown in the CC unit 10 shown in drawing 2 to this RF, and drawing 3 -- a short circuit -- it works like a conductor Therefore, to this RF, the equal circuit of a low-tension side shield ring portion comes to be shown in drawing 5 .
[0021] That is, the shield ring 4, the electric conduction ring 5, and capacitors 15, 21, and 23 form a closed loop, and form a slot antenna 31. And a circuit called up terminal 3-stray capacity C'-slot antenna 31-grounding of a bushing 2 is formed. If a corona occurs inside the gas-circuit-breaker tank 1, the RF more than VHF will occur and an electromagnetic wave will be emitted. This electromagnetic wave resonates with the electrical circuit of drawing 5 , and generates voltage among the points A and B in drawing. This voltage is drawn in the antenna terminal area 13 shown in drawing 4 to the measuring circuit which is not illustrated with a coaxial cable 28 through a capacitor 26. In this measuring circuit, it is detectable by detecting this voltage that the corona in gas mind occurred within the gas-circuit-breaker tank 1.
[0022] About the above-mentioned electromagnetic wave detection function, although the gas insulation device was explained, corona detection in other non-gas insulation devices, such as oil ON PT and oil ON CT, can also be performed, for example. Although the example of this invention was explained above, this invention is not limited to the above-mentioned example, and can deform within limits indicated by the claim variously.
[0023] For example, both the CC unit 10 and the pulse CT unit 12 can be omitted, and it can consider only as the electromagnetic wave detection function by the partial discharge. In this case, it connects too hastily with lead wire or a copper bar between the shield ring 4 and the electric conduction ring 5 instead of connecting in the CC unit 10 and the pulse CT unit 12. Moreover, although it is good also as a C form into which the shield ring 4 and the electric conduction ring 5 put notching 6 and 7 in this case, it can consider as an annular ring.
[0024] Moreover, either the CC unit 10 and the pulse CT unit 12 are also omissible. Also in this case, the shield ring 4 and the electric conduction ring 5 can also be made annular. Moreover, what is necessary is just to connect a capacitor, after removing the CC unit 10 or the pulse CT unit 12 in this case. Moreover, by dividing into two, the CC unit 10 and a pulse CT unit are summarized, and the series connection of them may be carried out to one place, and they may be attached in it.
[0025]
[Effect of the Invention] According to this invention, the shield ring for electrical machinery and apparatus bushings can be made to serve as the function of various sensors, as explained above.

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MEANS

[Means for Solving the Problem] In order to attain the above-mentioned purpose, this invention constitutes a slot-like current resonance circuit in the shield ring for electrical machinery and apparatus bushings by countering the shield ring prepared in the low-tension side of the electrical machinery and apparatus bushing section, preparing the electric conduction ring which was prepared in the electrical machinery and apparatus side, and was grounded, and connecting electrically a part of shield ring and some electric conduction rings.
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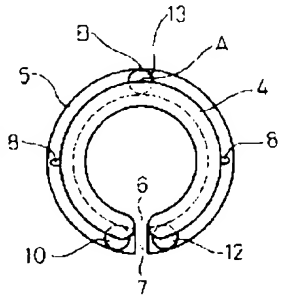
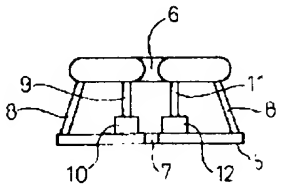
Drawing selection drawing 1

(a)



(b)



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OPERATION

[Function] If a corona occurs in the interior of an electrical machinery and apparatus, a RF several kHz - 1GHz or more will occur, and an electromagnetic wave will be emitted. To this RF, the shield ring, the electrical machinery and apparatus earth side, or an electric conduction ring operates as a slot antenna. Therefore, the corona generated inside the electrical machinery and apparatus is detectable by detecting the voltage generated in this slot antenna.
[0008] Moreover, by connecting a part for the connection between the above-mentioned shield ring, the electrical machinery and apparatus earth side, or an electric conduction ring with the capacity which constitutes the potentiometer for ****, a partial pressure is carried out between the stray capacity generated in the shield ring, and the voltage currently impressed to the bushing terminal can be measured by measuring the voltage of the ends of capacity. Furthermore, the partial discharge generated inside the electrical machinery and apparatus is detectable by connecting a part for the connection between the above-mentioned shield ring and an electric conduction ring by the pulse transformer.
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EXAMPLE

[Example] Drawing 6 shows the gas circuit breaker as one example of an electrical machinery and apparatus with which the shield ring for bushings of this invention is applied. Two bushings 2 and 2 are attached, the up terminals 3 and 3 are formed in the upper limit of each bushings 2 and 2, respectively, and, as for the tank 1 of the gas circuit breaker of illustration, the shield rings 4 and 4 are formed in a end face side. Stray capacity C' exists between the up terminal 3 and the shield ring 4. In addition, the high-tension-side shield ring can also be prepared in up terminal 3 and 3 side.
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[0021] That is, the shield ring 4, the electric conduction ring 5, and capacitors 15, 21, and 23 form a closed loop, and form a slot antenna 31. And a circuit called up terminal 3-stray capacity C'-slot antenna 31-grounding of a bushing 2 is formed. If a corona occurs inside the gas-circuit-breaker tank 1, the RF more than VHF will occur and an electromagnetic wave will be emitted. This electromagnetic wave resonates with the electrical circuit of drawing 5 , and generates voltage among the points A and B in drawing. This voltage is drawn in the antenna terminal area 13 shown in drawing 4 to the measuring circuit which is not illustrated with a coaxial cable 28 through a capacitor 26. In this measuring circuit, it is detectable by detecting this voltage that the corona in gas mind occurred within the gas-circuit-breaker tank 1.

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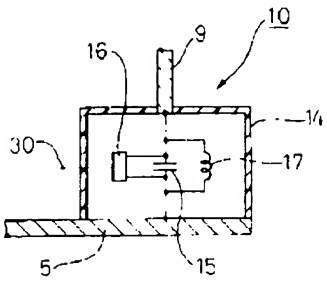
DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The plan and side elevation of an example of this invention.
[Drawing 2] The cross section showing the detail of the pulse CT unit of drawing 1 .
[Drawing 3] The cross section showing the detail of the pulse CT unit of drawing 1 .
[Drawing 4] The cross section showing the detail of the antenna terminal area of drawing 1 .
[Drawing 5] The representative circuit schematic of the shield ring of drawing 1 .
[Drawing 6] The side elevation of a gas circuit breaker.
[Description of Notations]
1 -- Gas-circuit-breaker tank
2 -- Bushing
3 -- Up terminal
4 -- Shield ring
5 -- Electric conduction ring
8 -- Insulating support
10 -- CC unit
12 -- Pulse CT unit
13 -- Antenna terminal area
15 -- Capacitor for partial pressure
16 -- Voltage converter
17, 19, 27 -- RF prevention inductance
21 -- Capacitor
22 -- Pulse CT
31 -- Slot antenna

[Translation done.]

Drawing selection drawing 2



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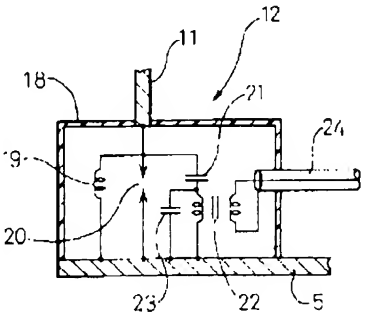

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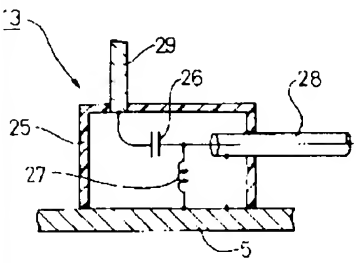
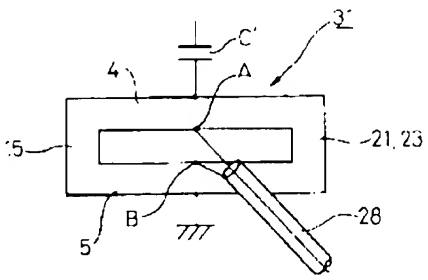


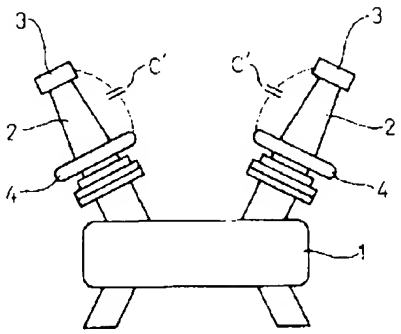
[Translation done.]

Drawing selection drawing 5



[Translation done.]

Drawing selection drawing 6



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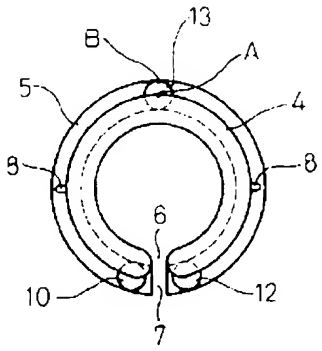
Drawing selection [Representative drawing]

(a)



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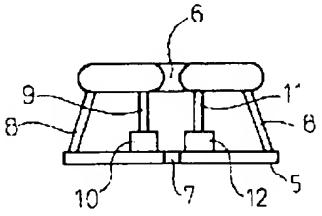

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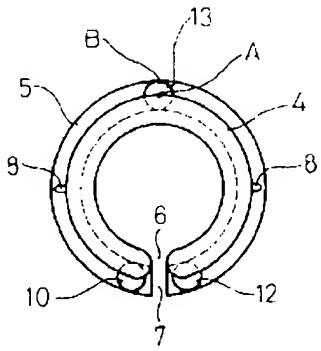
CLAIMS

[Claim(s)]
[Claim 1] The shield ring for electrical machinery and apparatus bushings characterized by constituting a slot-like current resonance circuit by connecting each part for between the earth side of the aforementioned electrical machinery and apparatus or the electric conduction rings which were newly prepared and were grounded which counter the shield ring prepared in the low-tension side of the electrical machinery and apparatus bushing section in the shield ring for electrical machinery and apparatus bushings electrically.
[Claim 2] The shield ring for electrical machinery and apparatus bushings according to claim 1 characterized by connecting the electrical installation portion between the aforementioned shield ring, the aforementioned electrical machinery and apparatus earth side, or the aforementioned electric conduction ring with the capacity which constitutes the potentiometer for ****.
[Claim 3] The shield ring for electrical machinery and apparatus bushings according to claim 1 characterized by connecting the electrical installation portion between the aforementioned shield ring, the aforementioned electrical machinery and apparatus earth side, or the aforementioned electric conduction ring by the pulse transformer.

[Translation done.]

Drawing selection [Representative drawing]

(a)



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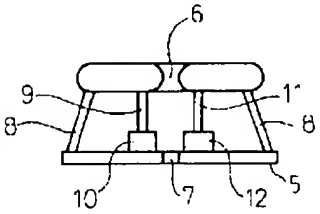

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